

WHAT IS CLAIMED IS:

1. A reforming catalyst degradation determining apparatus which determines whether a reforming catalyst that reforms a mixture of air and fuel is degraded, comprising:

a temperature sensor that detects a temperature of the reforming catalyst; and

a determining portion that determines whether the reforming catalyst is degraded based on the temperature of the reforming catalyst detected by the temperature sensor.

2. The reforming catalyst degradation determining apparatus according to claim 1, wherein the determining portion determines that the reforming catalyst is degraded if the temperature of the reforming catalyst detected by the temperature sensor is below a predetermined temperature.

3. The reforming catalyst degradation determining apparatus according to claim 2, wherein the predetermined temperature is set according to an air-fuel ratio of the mixture supplied to the reforming catalyst.

4. The reforming catalyst degradation determining apparatus according to claim 1, wherein the determining portion determines whether the reforming catalyst is degraded based on a rate of change in the temperature of the reforming catalyst detected by the temperature sensor.

5. The reforming catalyst degradation determining apparatus according to claim 4, wherein the determining portion determines that the reforming catalyst is degraded if the rate at which the temperature of the reforming catalyst detected by the temperature sensor rises, after the temperature of the reforming catalyst starts to rise, has not reached a predetermined rate.

6. The reforming catalyst degradation determining apparatus according to claim 5, wherein the determining portion determines that the rate at which the temperature of the reforming catalyst rises has not reached the predetermined rate if the temperature of the reforming catalyst has not reached a predetermined temperature at a predetermined time after the temperature of the reforming catalyst starts to rise.

7. The reforming catalyst degradation determining apparatus according to claim 5, wherein the determining portion determines that the rate at which the temperature of the reforming catalyst rises has not reached the predetermined rate, based on the time it takes for the temperature of the reforming catalyst to rise to a predetermined temperature after the temperature of the reforming catalyst starts to rise.

8. The reforming catalyst degradation determining apparatus according to claim 4, wherein the determining portion determines that the reforming catalyst is degraded if the rate at which the temperature of the reforming catalyst falls, after the temperature of the reforming catalyst starts to fall, is faster than a predetermined rate.

9. The reforming catalyst degradation determining apparatus according to claim 8, wherein the determining portion determines that the rate at which the temperature of the reforming catalyst falls is faster than the predetermined rate, based on the time it takes the temperature of the reforming catalyst to fall, after the temperature of the reforming catalyst starts to fall, to a predetermined temperature.

10. The reforming catalyst degradation determining apparatus according to claim 4, wherein the determining portion determines whether the reforming catalyst is degraded based on the rate of rise and the rate of fall in the temperature of the reforming catalyst detected by the temperature sensor.

11. The reforming catalyst degradation determining apparatus according to claim 10,

wherein the determining portion determines whether the reforming catalyst is degraded based on the time it takes the temperature of the reforming catalyst to rise to a predetermined temperature after the temperature of the reforming catalyst starts to rise and the time it takes the temperature of the reforming catalyst to fall to a predetermined temperature after the temperature of the reforming catalyst starts to fall.

12. The reforming catalyst degradation determining apparatus according to claim 4, wherein the determining portion determines whether the reforming catalyst is degraded based on the rate of change in the temperature after the air-fuel ratio of the mixture supplied to the reforming catalyst has been changed.

13. The reforming catalyst degradation determining apparatus according to claim 1, wherein the temperature sensor is disposed on a downstream side of the reforming catalyst.

14. The reforming catalyst degradation determining apparatus according to claim 13, wherein the determining portion determines that the reforming catalyst is degraded if the temperature detected by the temperature sensor is higher than a predetermined temperature.

15. The reforming catalyst degradation determining apparatus according to claim 13, wherein the determining portion determines that the reforming catalyst is degraded if, after observing that the temperature detected by the temperature sensor is higher than a predetermined temperature, the temperature detected by the temperature sensor then falls below a predetermined temperature.

16. The reforming catalyst degradation determining apparatus according to claim 1, wherein the temperature sensor detects the temperature on an upstream side of the reforming catalyst and the temperature on the downstream side of the reforming catalyst.

17. The reforming catalyst degradation determining apparatus according to claim 16, wherein the determining portion determines whether the reforming catalyst is degraded based on a difference in the temperature on the upstream side of the reforming catalyst and the temperature on the downstream side of the reforming catalyst.

18. The reforming catalyst degradation determining apparatus according to claim 1, further comprising:

an air-fuel ratio controller that sets an air-fuel ratio of the mixture supplied to the reforming catalyst based on the temperature of the reforming catalyst detected by the temperature sensor.

19. A reforming catalyst degradation determining method for determining whether a reforming catalyst that reforms a mixture of air and fuel is degraded, comprising the steps of:

detecting a temperature of the reforming catalyst; and

determining whether the reforming catalyst is degraded based on the detected temperature of the reforming catalyst.

20. The reforming catalyst degradation determining method according to claim 19, wherein the reforming catalyst is determined to be degraded if the detected temperature of the reforming catalyst is below a predetermined temperature.

21. The reforming catalyst degradation determining method according to claim 20, wherein the predetermined temperature is set according to an air-fuel ratio of the mixture supplied to the reforming catalyst.

22. The reforming catalyst degradation determining method according to claim 19, wherein whether the reforming catalyst is degraded is determined based on a rate of

change in the detected temperature of the reforming catalyst.

23. The reforming catalyst degradation determining method according to claim 22, wherein the reforming catalyst is determined to be degraded if the rate at which the detected temperature of the reforming catalyst rises, after the temperature of the reforming catalyst starts to rise, has not reached a predetermined rate.

24. The reforming catalyst degradation determining method according to claim 23, wherein the reforming catalyst is determined to be degraded if the temperature of the reforming catalyst has not reached a predetermined temperature at a predetermined time after the temperature of the reforming catalyst starts to rise.

25. The reforming catalyst degradation determining method according to claim 23, wherein the predetermined rate is determined based on the time it takes for the temperature of the reforming catalyst to rise to a predetermined temperature after the temperature of the reforming catalyst starts to rise.

26. The reforming catalyst degradation determining method according to claim 22, wherein the reforming catalyst is determined to be degraded if the rate at which the temperature of the reforming catalyst falls, after the temperature of the reforming catalyst starts to fall, is faster than a predetermined rate.

27. The reforming catalyst degradation determining method according to claim 26, wherein the predetermined rate is set based on the time it takes for the temperature of the reforming catalyst to fall to a predetermined temperature.

28. The reforming catalyst degradation determining method according to claim 22, wherein whether the reforming catalyst is degraded is determined based on the rate at which the temperature of the reforming catalyst rises and the rate at which the

temperature of the reforming catalyst falls.

29. The reforming catalyst degradation determining method according to claim 28, wherein whether the reforming catalyst is degraded is determined based on the time it takes the temperature of the reforming catalyst to rise to a predetermined temperature after the temperature of the reforming catalyst starts to rise and the time it takes the temperature of the reforming catalyst to fall to a predetermined temperature after the temperature of the reforming catalyst starts to fall.

30. The reforming catalyst degradation determining method according to claim 22, wherein whether the reforming catalyst is degraded is determined based on the rate of change in the temperature of the reforming catalyst after an air-fuel ratio of the mixture supplied to the reforming catalyst has been changed.

31. The reforming catalyst degradation determining method according to claim 19, wherein the temperature on a downstream side of the reforming catalyst is detected.

32. The reforming catalyst degradation determining method according to claim 31, wherein the reforming catalyst is determined to be degraded if the temperature detected on the downstream side of the reforming catalyst is higher than a predetermined temperature.

33. The reforming catalyst degradation determining method according to claim 32, wherein the reforming catalyst is determined to be degraded if, after observing that the temperature detected on the downstream side of the reforming catalyst is higher than the predetermined temperature, the detected temperature then falls below a predetermined temperature.

34. The reforming catalyst degradation determining method according to claim 19,

wherein the temperature on an upstream side of the reforming catalyst and the temperature on the downstream side of the reforming catalyst are detected.

35. The reforming catalyst degradation determining method according to claim 34, wherein whether the reforming catalyst is degraded is determined based on a difference in the temperature on the upstream side of the reforming catalyst and the temperature on the downstream side of the reforming catalyst.